RoHS Compliant
Directive 2011/65/EU

# SPECIFICATION

Customer:

| | |
|---|---|
| Item: | CRYSTAL UNIT |
| Type: | NX3215SA |
| Nominal Frequency: | 32.768kHz |
| Customer's Spec. No.: | --- |
| NDK Spec. No.: | NX3215SA-10ppm-45KOhm-6 |

Receipt

Charge:

| | | |
|---|---|---|
| Sales | NDK-I : Paola Bandera | Tel. 39-02-96702920 |
| Engineer | 5th Eng. Dept.: Hasuike | Tel. 81-4-2900-6632 |

| | |
|---|---|
| Approved | H.Matsudo |
| Checked | --- |
| Drawn | Y.Hasuike |

**Revision Record**

| Rev. | Rev. Date | Items | Contents | Remarks |
|---|---|---|---|---|
| --- | 18.Oct.2012 | Issue | --- | --- |

NIHON DEMPA KOGYO CO., LTD.

1. Customer specifications number : ---

2. NDK specification number :

3. Type : NX3215SA

4. Electrical characteristics

| | |
|---|---|
| 4.1. Nominal Frequency ($F_0$) | : 32.768 kHz |
| 4.2. Overtone Order | : Fundamental |
| 4.3. Adjustment tolerance | : $\pm 10 \times 10^{-6}$ Max. (at +25°C ,Not include aging) |
| 4.4. Turning Point | : +25°C±5°C |
| 4.5. Temperature coefficient | : $-0.035 \times 10^{-6}$ / °C$^2$ Max. |
| 4.6. Equivalent Resistance ($R_R$) | : 45 kΩ Max. |
| 4.7. Shunt Capacitance ($C_0$) | : 1.0 ± 0.5 pF |
| 4.8. Motional Capacitance ($C_1$) | : 4.0 ± 2.0 fF |
| 4.9. Insulation Resistance | : Terminal to terminal insulation resistance also terminal to cover insulation resistance must be 500MΩ (Min.) when DC100V ±15V is applied. |

5. Measurement circuit

5.1. Frequency measurement

| | |
|---|---|
| ・Measuring instrument | : Network Analyzer (CNA-LF made in Transat corp.) |
| ・Load capacitance ($C_L$) | : 6Pf |
| ・Level of drive | : 0.1 μW |

5.2. Equivalent resistance measurement

| | |
|---|---|
| ・Measuring instrument | : Network Analyzer (CNA-LF made in Transat corp.) |
| ・Load capacitance ($C_L$) | : Series |
| ・Level of drive | : 0.1 μW |

6. Other performances

| | |
|---|---|
| 6.1. Operating Temperature range | : - 40 to + 85°C |
| 6.2. Storage Temperature range | : - 40 to + 85°C |
| 6.3. Maximum drive level | : 0.5 μW Max. |
| 6.4. Aging (at +25 °C) | : $\pm 3 \times 10^{-6}$ Max. / 1 year |

7. Examination results document

Since a performance is guaranteed, an examination results document does not submit.

8. Application drawing

| | |
|---|---|
| 8.1. Dimension drawing | : EXD14B-00462 |
| 8.2. Taping and reel figure | : EXK17B-00303 |
| 8.3. Holder marking | : EXH11B-00422 |
| 8.4. Reel Packing | : EEK17B-00015 |
| 8.5. Reliability assurance Item | : EXS30B-00661 |

9. Notice

9.1 Order items are manufactured according to specification. As to conditions, which are not indicated in t his specification and unpredictable such as applied condition and oscillation margin, please check them beforehand.

9.2 Unless we receive request for modification within 3 weeks from the issue date of this NDK specification sheet, we will supply products according to this specification. Also, if you'd like to modify specification of order, which has been placed with delivery request within 3 weeks from the issue data of this specification sheet, we would like to discuss with you separately.

9.3 In no event shall the company be liable for any product failure resulting from an inappropriate handling or operation of the product beyond the scope of its guarantee.

9.4 Where any change to the process condition is made due to the change(s) in the production line, inform personnel of the specifications.

9.5 Should this specification data give rise to any disputes relating to any intellectual property rights or any other rights of a third person, the company shall not indemnify anyone for any damage. Their disclosure must not be construed as the grant of a license to use any of the intellectual property rights owned by the company.

9.6 If you intend to use products listed on this specification for applications that may result in loss of life or assets (controls relating to safety, medical equipment, aeronautical equipment, space equipment, etc.), please do not fail to advise us of your intention beforehand.

9.7 In the company's production process whatever amount of ozone depleting substances (ODS) as s pecified in the Montreal protocol is not used.

9.8 Information contained in this specification must not be quoted, reproduced or used for other purposes including processing either in part or in full without obtaining prior approval from the company.

10. Prohibited items

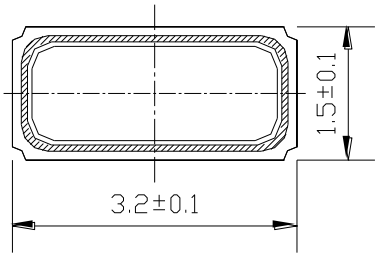
Be sure to use the product under the following conditions. Otherwise, the characteristics deterioration or destruction of the product may result.

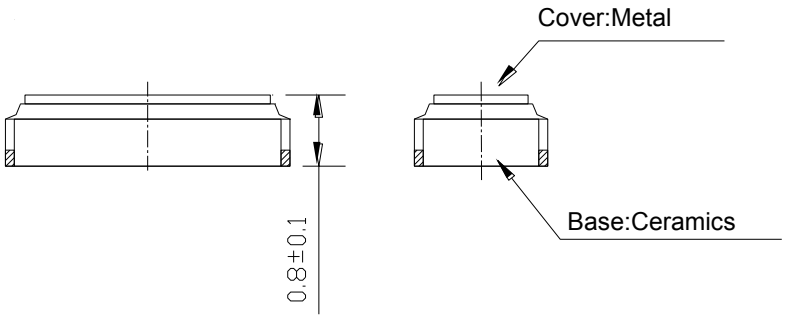
(1)Reflow soldering heat resistance

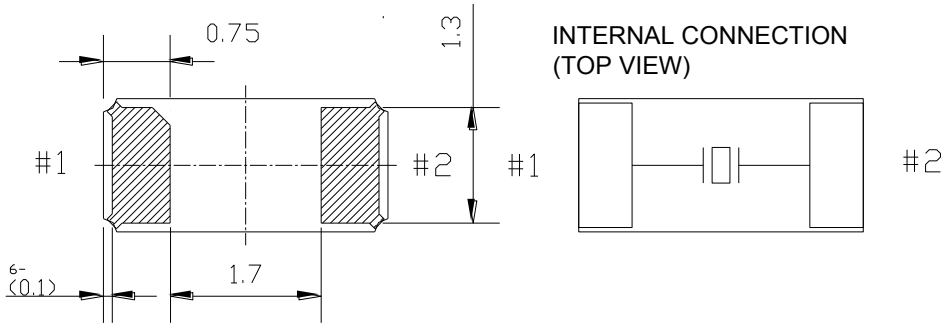
| | |
|---|---|
| Peak temperature | : 265°C, 10 sec |
| Heating | : 230°C or higher, 30 sec |
| Preheating | : 150°C to 180°C, 120 sec |
| Reflow passage times | : Two times |

(2)Manual soldering heat resistance

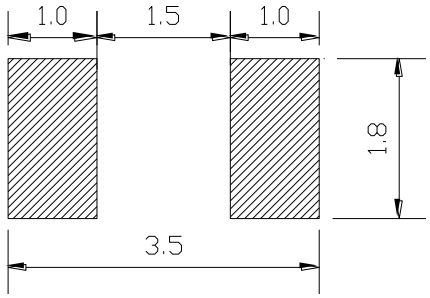
Pressing a soldering iron of 400°C on the terminal electrode for four seconds (twice).



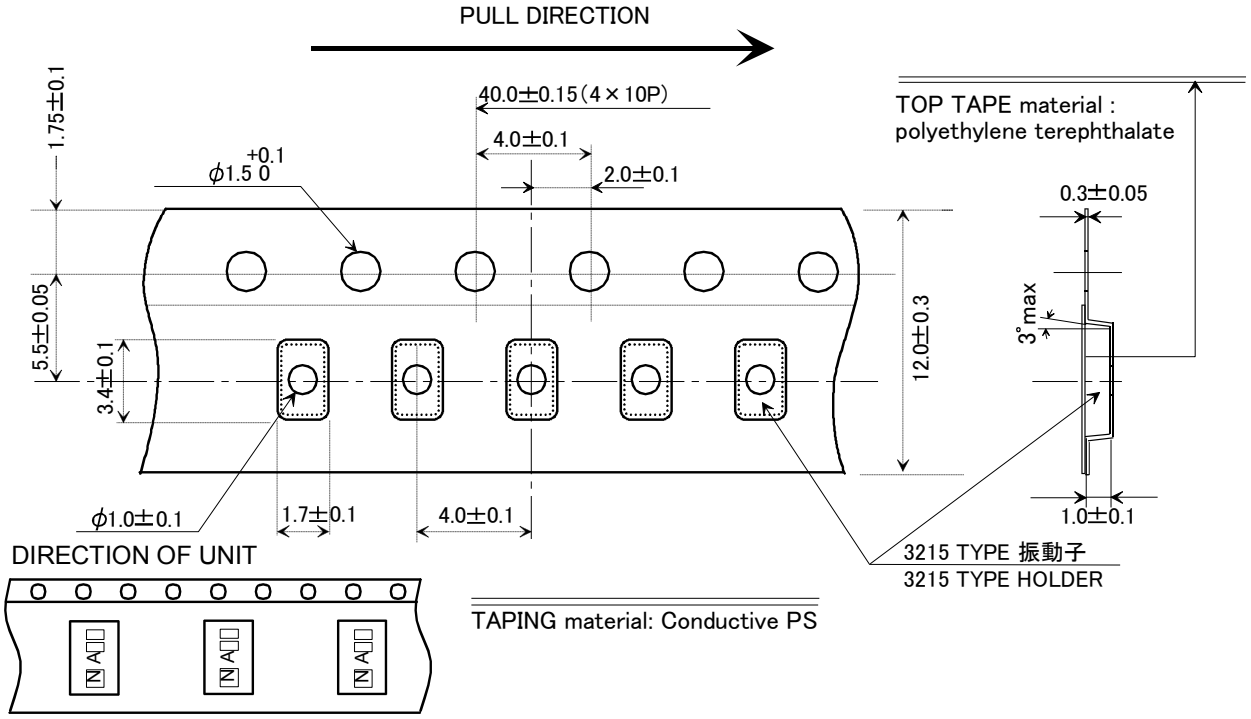

## Recommended soldering pattern

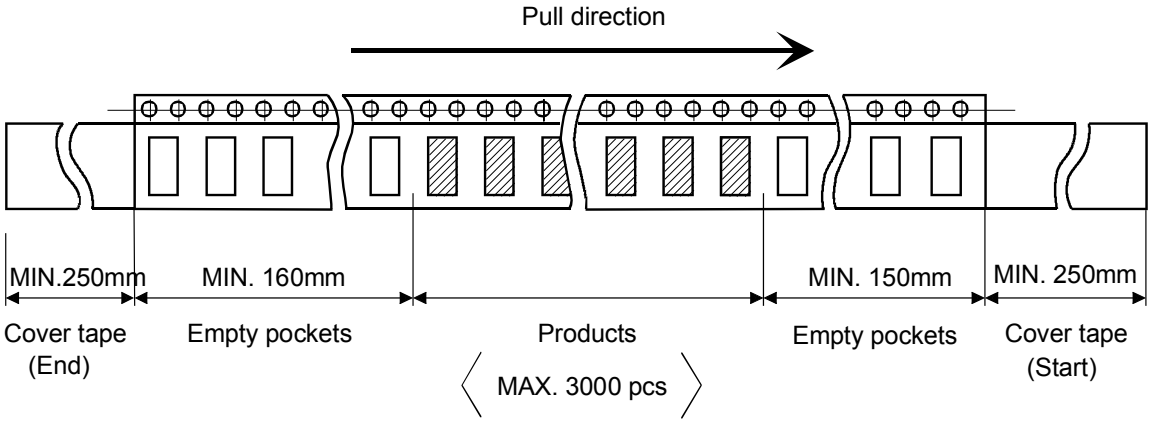



| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| B | 10.May.2012 | Hasuike | Matsudo | Add bilingual |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | 30.Aug.2009 | Miyahara | Dimension:mm | ±0.2 | 10 / 1 |
| Designed | 30.Aug.2009 | Miyahara | Title | Drawing No. | Rev. |
| Checked | --- | --- | **NX3215SA External Dimension** | **EXD14B-00462** | B |
| Approved | 30.Aug.2009 | K. Ueki | | | |

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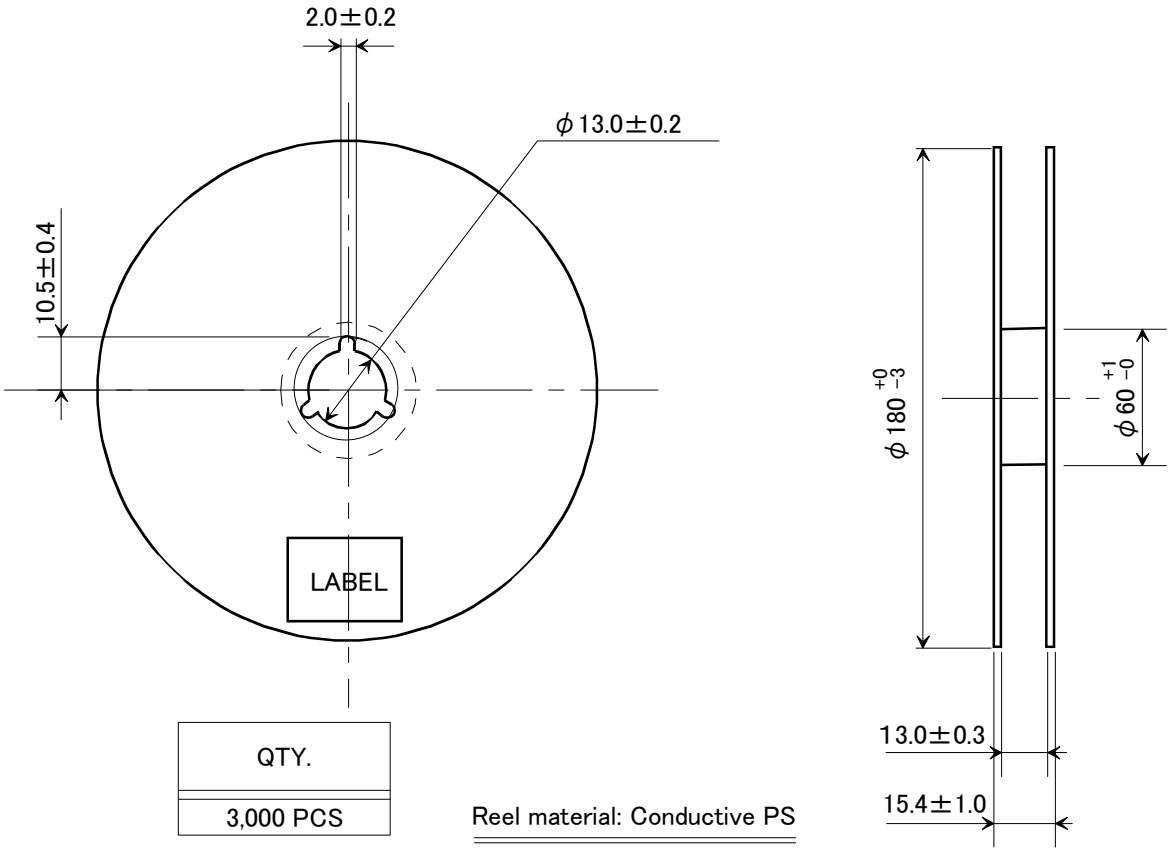




| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| A | 3.Aug.2012 | Hasuike | Matsudo | Added English |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | 9.Jul.2009 | N.Yamamoto | mm | | / |
| Designed | 9.Jul.2009 | N.Yamamoto | Title | Drawing No. | Rev. |
| Checked | --- | --- | 3215 TYPE Taping and Reel Spec. | EXK17B-00303 1/2 | A |
| Approved | 9.Jul.2009 | K.Ueki | | | |

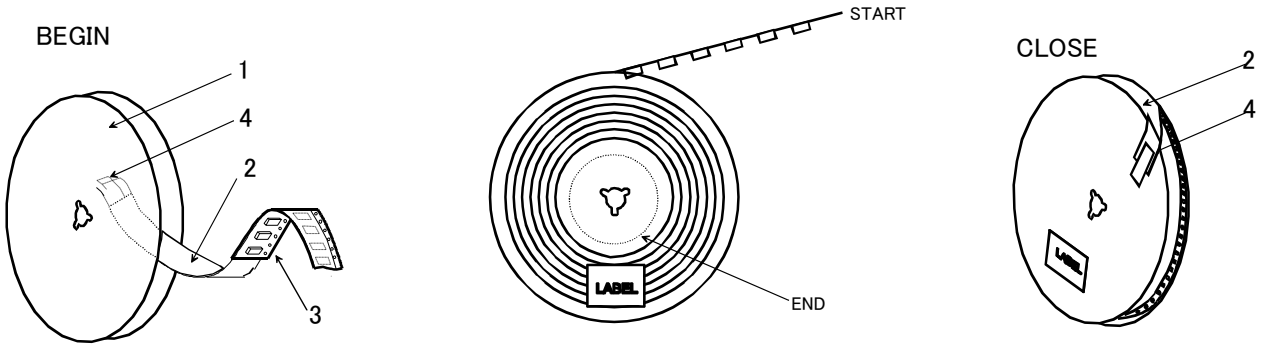
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Form M-1




Reel material: Conductive PS

EIAJ standard reel

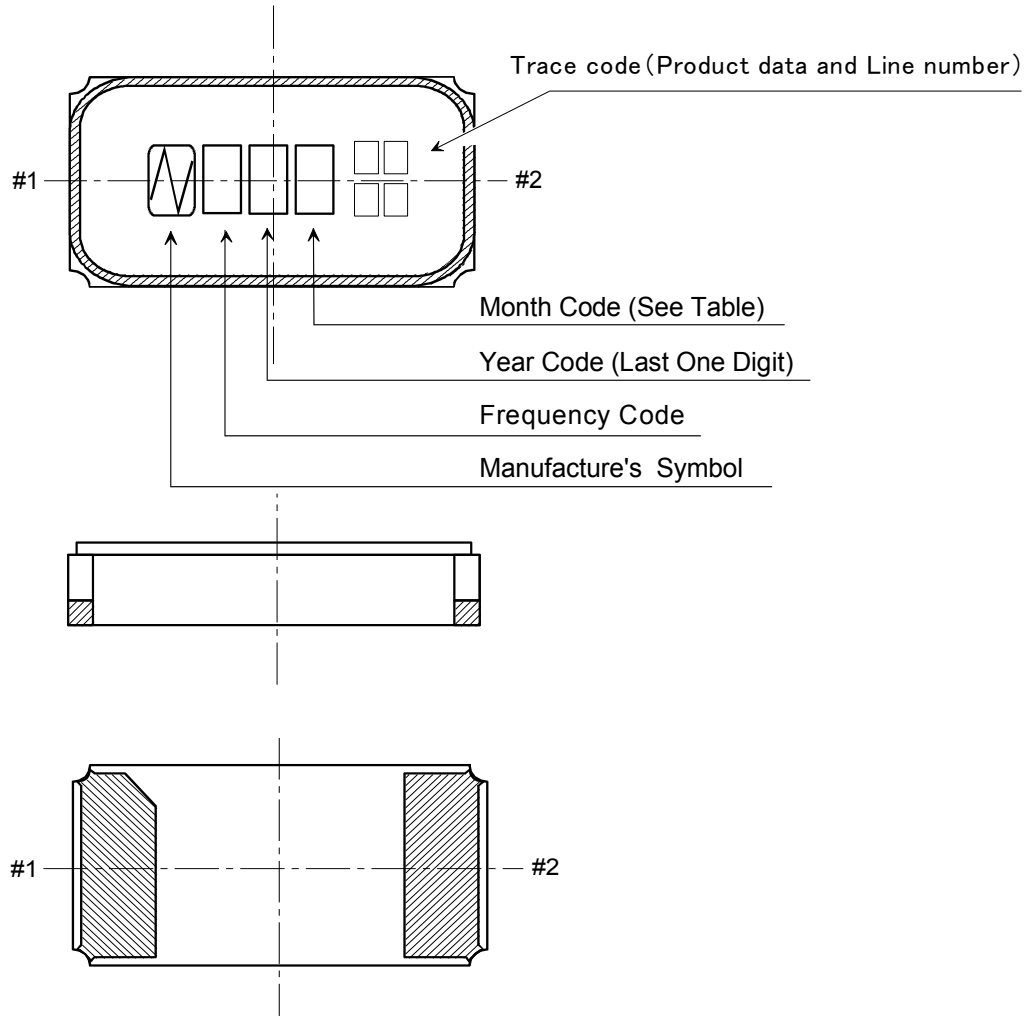



| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| A | 3.Aug.2012 | Hasuike | Matsudo | Added English |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | 9.Jul.2009 | N.Yamamoto | mm | | / |
| Designed | 9.Jul.2009 | N.Yamamoto | Title | Drawing No. | Rev. |
| Checked | --- | --- | 3215 TYPE Taping and Reel Spec. | EXK17B-00303 2/2 | A |
| Approved | 9.Jul.2009 | K.Ueki | | | |

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Form M-1




NOTE

1. Month Code

| Month | 1 Jan. | 2 Feb. | 3 Mar. | 4 Apr. | 5 May | 6 June | 7 July | 8 Aug. | 9 Sep. | 10 Oct. | 11 Nov. | 12 Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | X | Y | Z |

2. Frequency Code

   A : 32.768kHz

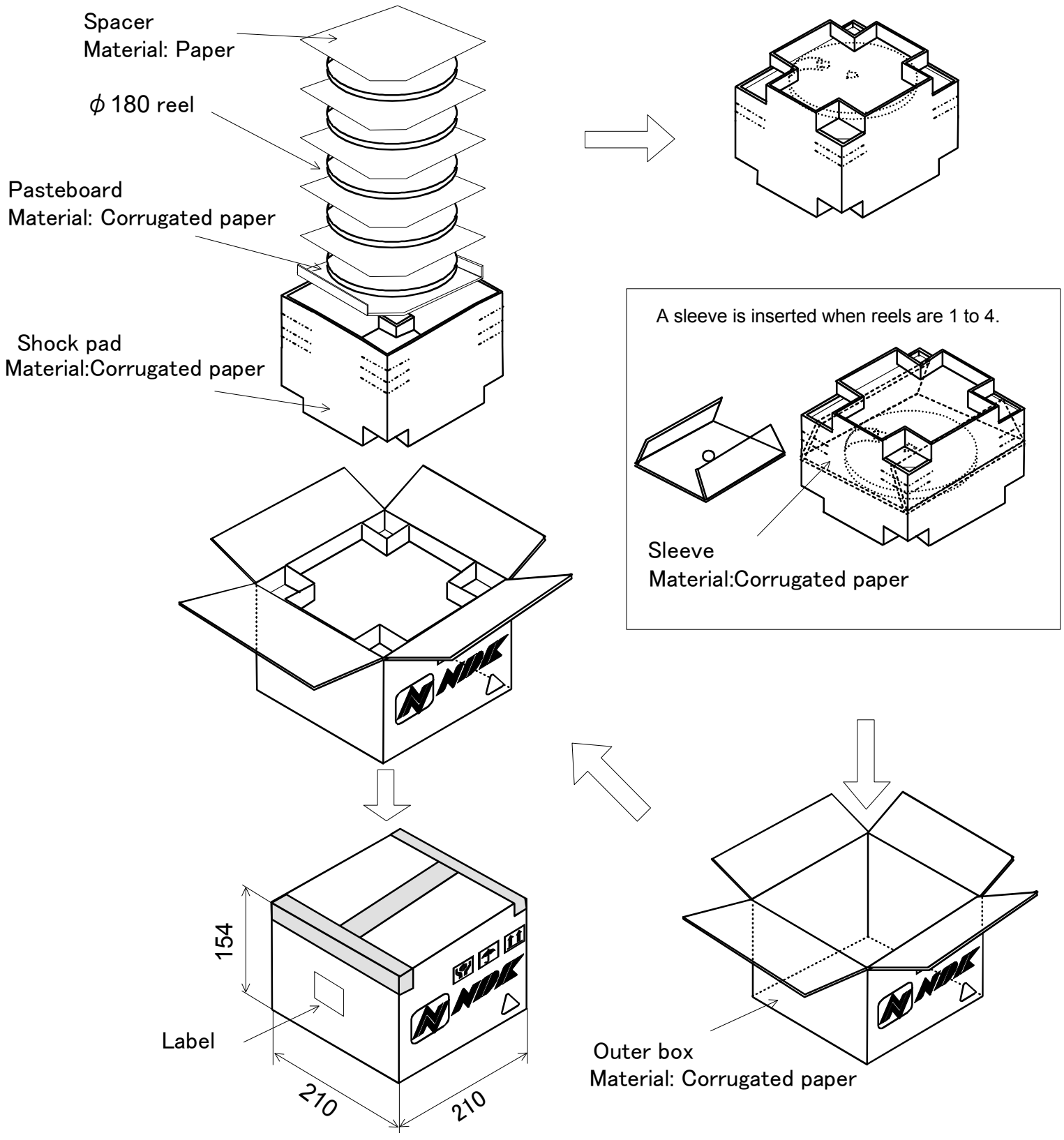
3. Marking Method

   Marking Method is Laser Triming.

| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| | | | | |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | 28.OCt.2009 | Miyahara | Dimension:mm | | / |
| Designed | 28.OCt.2009 | Miyahara | Title: **NX3215SA Marking Drawing** | Drawing No.: **EXH11B-00422** | Rev. |
| Checked | -- | -- | | | |
| Approved | 28.OCt.2009 | Ueki | | | |

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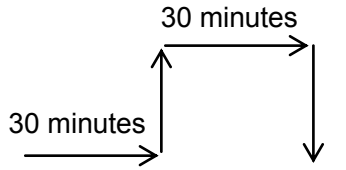

| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| C | 4 Jul. 2012 | H.Ohkubo | K.Oguri | Addition of condition when reels are 1 to 4. |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | 26 Feb. 2010 | H. Ohkubo | Dimension:mm | --- | --- |
| Designed | 26 Feb. 2010 | K.Oguri | Title | Drawing No. | Rev. |
| Checked | 26 Feb. 2010 | K.Oguri | **180 dia. Reel package** | **EEK17B-00015** | C |
| Approved | 26 Feb. 2010 | J. Nakamura | | | |

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# Reliability assurance item



| No. | Test Item | Test Methods | Specification Code |
|---|---|---|---|
| 1 | AGING | 1 year at 25 °C +/- 3°C | a |
| 2 | HEAT RESISTANCE | at +85 °C for 500 hours. | a |
| 3 | COLD RESISTANCE | at –40 °C for 500 hours. | a |
| 4 | HUMIDITY | at +85 °C with 80 to 85 % RH for 500 hours. | a |
| 5 | THERMAL SHOCK | Temperature cycle as shown in (Fig.1) for 100 cycle.<br>+85 °C +/- 3 °C<br>-40 °C +/- 3 °C<br><br><br>ONE CYCLE (Fig.1) | a |
| 6 | VIBRATION | Frequency Range : 10 to 2000Hz<br>Amplitude or Acceleration : 1.52 mm or 196m/s$^2$<br>1 cycle : 20 minutes<br>Test time : Three mutually perpendicular axes each 12 times. | a |
| 7 | SHOCK 1 | Shock : 3000 Gs 0.3 msec.<br>Test time : Six mutually perpendicular axes each 1 times. | a |
| 8 | SHOCK 2 | Shock : Device are put on the weight of 200 g and dropped on concrete board.<br>Height : 1.5 m<br>Drop times : Six mutually perpendicular axes each 10 times. | b |
| 9 | SOLDERABILITY | Residual heat temperature 150 °C<br>Residual heat time 60 to 120 sec<br>Peak temperature 240°C<br>(more than 215 °C 10 to 30 sec) | c |
| 10 | REFLOW RESISTANCE | Temperature cycle as shown in (Fig2.) for 3 cycle. | a |

| Specification code | Specification |
|---|---|
| a | dF/F ≤ +/- 5ppm<br>dCl ≤ +/- 5 kohm |
| b | dF/F ≤ +/- 15ppm<br>dCl ≤ +/- 5 kohm |
| c | The electrodes shall acquire a new solder coat over at least 90 % of immersed area. |

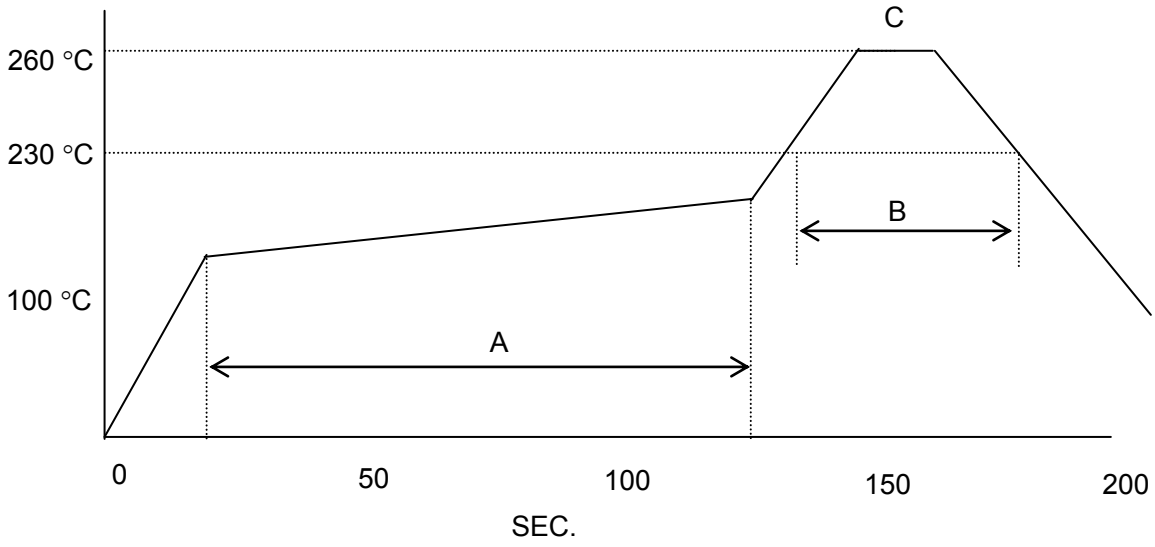



Fig.2 REFLOW

A: 150 to 180 °C ( 60 to 120 sec. )
B: 230 °C min. ( 30 sec. max. )
C: PEAK-TEMP. 260 °C +/- 5 °C ( 10sec. max. )